



Usability Metrics Used for Web Site up Gradation

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Abstract—There are thousands of Web sites designed & available on Net. It is time to identify that whether such large Web sites are accessible by the customers and does the Web sites provides Customer Oriented Services/Information (COS/I). Most of Web suffers from a noticeable lack of supporting the different information that needs those different users may have regarding a certain topic. This paper provides general information about key points in building Web-based services such as to levels of information need in Web sites, analysis of use of Web and its creditability and provide adaptive support that meet Customer Oriented Services/Information. Here we discuss about the analysis of the design of Web sites after the design. This helps in update the Web sites and providing more information oriented.

Keyword: Net, accessible, Customer Oriented Services, Classification, and Web based service, Web sites

I. INTRODUCTION

For most of us, the large-scale computer network called the Internet is still a dazzling wonder. Even those who have learned our way around several forms of Internet-based communication such as using email and browsing the World Wide Web are at a loss when it comes to designing a Web site of our own. Whether the Web site will promote the storytelling, it will need a **clear purpose**. But what kind of purposes can a Web site serve. In other words, what kind of value can a Web site offer, which will cause people to use it and even return to it again and again? Let's start by taking look at the most common types of Web sites and examine some of the issues involved in creating a Web site that will build a close and ongoing relationship with the prospects and customers. This will provide the framework for creating a better Web site. Based on the information's that available. There are several approaches. **The Brand Name Web Site, The Information Storehouse, The Links Page, Do-An-Activity Page, The Point-of-View Site, Community Gathering-Place, Brochure Sites, E-Commerce Sites, Communities, Portals, Search Engines** etc[1].

Web applications' quality, reliability and functionality are important factors because software glitches could block entire businesses and cause major embarrassment. These factors have increased the need for methods, tools, and models to improve Web applications (design, analysis, testing, and so on). The applications analysed are composed of Web documents and Web objects[2]. This paper describes a model based analysis to sites to help the user (e.g., software developers) define quantitative system to measure.

This paper is organized as follows. Section 2 presents a review of Classification of different Web sites and groups them to category. Section 3 summarizes different source that helps for design Web sites and maintain the proper information. Section 4 introduces the model focused on Analysis of design and based on software measurements. Moreover, it introduces an analysis of prediction systems, regression and instance-analogies based.

II. WEB SITE CLASSIFICATIONS

With a well thought-out strategy and realistic expectations, a business or organization can have a highly successful Web site created for them. The Web is a new medium with new rules, and in order to achieve an effective presence, one must be aware of the various types of Web sites and the roles that they can play. There are many different types of Web sites. Short lists of some of the different categories are listed below. Of course, any site can be comes any one of the types given below, and actually may include elements from some or all of them[3].

1. *Affiliate Website*: enabled portal that rend not only its custom CMS but also syndicated content from other content providers for an agreed fee.
2. *Archive Website* : used to preserve valuable electronic content threatened with extinction.
3. *Adult Website*: These are everywhere and fall into just about all of the categories. They are the plague of the net and probably the less said about them the better.
4. *Advocacy Website*: An Advocacy Web Site is one sponsored by an organization attempting to influence public opinion and provides some awareness to customer.
5. *Blog Website*: sites generally used to post online diaries which may include discussion forums.
6. *Brochure/Booklet Website*: This is where you have several pages of information. Either several pages of information on one product or on several different products.

7. *Business/Marketing Website*: Sites which provide support for a business. Technical support sites can fall into this category. A Business/Marketing Web Site is one sponsored by a commercial enterprise.
8. *Bulletin Board Website*: With a bulletin board, you can bring your user community together and have them help each other while they are helping you get a better idea of what they are looking for on your site or from your business.
9. *Content Website*: sites whose business is the creation and distribution of original content
10. *Corporate Website*: used to provide background information about a business, organization, or service.
11. *Community Website*: a site where persons with similar interests communicate with each other, usually by chat or message boards.
12. *Commercial Website*: Sites which exist to sell something. That's all they do is sell a product. These sites do not make money off advertising they create the advertising.
13. *Database Website*: a site whose main use is the search and display of a specific database's content such as the Internet Movie Database or the Political Graveyard.
14. *Development Website*: a site whose purpose is to provide information and resources related to software development, Web design and the like.
15. *Directory Website*: a site that contains varied contents which are divided into categories and subcategories, and Open Directory Project.
16. *Download Website*: strictly used for downloading electronic content, such as software, game demos or computer wallpaper.
17. *Employment Website*: allows employers to post job requirements for a position or positions and prospective employees to fill an application.
18. *Entertainment Website*: Sites that are used for entertainments like game, music's, cartoon, movies etc. which are oriented entirely towards entertainment.
19. *Free Stuff Website*: Sites which offer free services or products. These might offer free Webmaster tools like site checkers or free services such as site submission.
20. *Fan Website*: A Web site created and maintained by fans of and for a particular celebrity, as opposed to a Web site created, maintained, and controlled by a celebrity through their own paid Webmaster.
21. *Forum Website*: Forum sites are large communities of people who interact with each other in forums. It has thousands of members talking to each other in the forums.
22. *Flyer Website*: This is your basic Web page about your company. Like a full page Yellow Pages or the basic flyer posted or handed out. The flyer would be information on a product or service that you offer.
23. *Game Website*: a site that is itself a game or "playground" where many people come to play.
24. *Geo-domain Website*: refers to domain names that are the same as those of geographic entities, such as cities and countries.
25. *Gripe Website*: a site devoted to the critique of a person, place, corporation, government, or institution.
26. *Humor Website*: satirizes, parodies or otherwise exists solely to amuse.
27. *Informational Website*: These are sites which give information. An Informational Web Site is one whose purpose is to present factual information. Most government, educational and non-profit institutions have an informational site.
28. *Java applet site*: contains software to run over the Web as a Web application.
29. *Mirror* : A complete reproduction of a Website.
30. *Money Making Website*: These are the scourge of the Web and include sites which offer only page after endless page of pay-to-surf program listings or breathless descriptions of the newest program.
31. *Mailing Website*: This sites are basically sending Electronics information, picture, Message etc. between the various users for their purposes.
32. *News Website*: A News Web Site is one whose primary purpose is to provide extremely current information and on each moment update its information.
33. *Phish Website*: a Website created to fraudulently acquire sensitive information, such as passwords and credit card details, by masquerading as a trustworthy person or business, an electronic communication.
34. *Personal Home Website*: One of the favourites is the personal home page. These can be anything and can contain virtually everything. A Personal Web Site is one published by an individual who may or may not be affiliated with a larger institution.
35. *Product Catalogue Website*: If you have several products, you may have these arranged in some form of catalogue.
36. *Political Website*: A site on which people may voice political views.
37. *Pornography Website*: a site that shows pornographic images and videos.
38. *Presentation Website*: This site tells that the current trend of Web and information oriented that helps to guide on various area for covering more information.
39. *Rating Website*: A site on which people can praise or disparage what is featured.
40. *Review Website*: A site on which people can post reviews for products or services.
41. *Replicating Website*: This is a strange idea. Go to a site and sign up to create an identical site of your own. Attract others to it, which also create identical sites of their own.

42. *Registration/Feedback Forms Website:* You may want users to register to be able to use your site. This will give you a list of people to which you can market.
43. *School Website:* a site on which teachers or administrators can post information about current events at or involving their school.
44. *Searching Website:* These sites are probably the single most useful tool on the Internet. Without them it would be next to impossible to find anything.
45. *Shock Website:* includes images or other material that is intended to be offensive to most viewers.
46. *Wares Website:* a site filled with illegal downloads.
47. *Web portal Website:* a site that provides a starting point or a gateway to other resources on the Internet or an intranet. ed
48. *Wiki Website:* a site which users collaboratively edit such as Wikipedia.
49. *Yellow Pages Website:* While you may or may not be creating your own pages, in addition to having basic contact information, you also have your logo and some simple description of your services and hours.

III. INFORMATION THAT GUIDE TO ANALYSIS

The more times a potential client visits your Web site, the more likely they will be to do business with you in the future. The best way to keep potential clients coming back and to provide an added service for your existing clients is to make your Web site an information resource[4][6]. As well, this type of Web site enables your business to showcase its expertise and gain respect for being knowledgeable in your business or profession. There are seven fundamental information resources that required by the sites such as:

1. **Fact** A unique bit of information that identifies an object, person, place, or date.
2. **Concept** A category of items or ideas that share common features.
3. **Procedure** A series of steps that show how to make or do something.
4. **Process** A description of how something works or operates.
5. **Principle** is description of Rules, heuristics, guidelines, criteria that predict an outcome.
6. **Function** shows what part of the production process they are involved in.
7. **Structure /Structural Aspect** Approach to knowledge which has influenced a number of academic disciplines including aesthetics, critical theory.

3.1 Different Types of Information

Information can be found on pages filled with content. Other pages are used to structure the Web site and allow easy and intuitive navigation. We distinguish between **navigation and content pages** and evaluate the transitions between both categories. In the following table-1 we just provided various types of information and combine of this information into a new approach to Web sites and explain how this approach helps to estimate the degree of fulfilment of a Web site's purpose.

Table-I: describe about information that provided by a web sites

Information	Description
Introductory	This type of information is provided by the agent whenever a new topic or aspect of interest is accessed by the user.
Summary	This provides an overall perspective of the items that have been accessed in the current session.
Comparison	The purpose of this type of information is to compare the currently accessed topic with others that have been accessed previously, and identify common attributes.
Search	It Comparison table of recommended search engines, it show all the search information in the network. The Table comparing some of the best human-selected collections of Web pages.
Difference	This serves to bring into focus an aspect of the currently accessed topic that was not present in the previously accessed one; this information is useful for the user to better learn and remember the descriptions of the works of art.
Linking	It need to more information which creates a link to the information in your file. Each time you open the presentation, it offers to update the links. If the linked information in the file has changed, this updates it in your presentation also.
Picture	It is unique information based and viewer dedicated to serious photography. It extracts metadata (EXIF) from JPG and RAW files and makes it available in a convenient and welcoming interface[7].
Curiosity	Additional peculiar information can increase the visitor's involvement, highlighting those features of the work that can raise the user's interest. The above logical dimensions characterizing the information provided by a virtual guide aim to make the user's visit more interesting and pleasant.
Composite	Even though you may have some information in the Brochure/Booklet site, as you find the questions that customers are asking, you may decide to place more detailed information on your site for those who just want more details.

Basically most of the websites use the first little information. And the information that use by users are different hence there are different types of users are provided in the table-II.

Table-II: it describe about the users and their intentions

Types Of Users	User's Intention on website	Example
Naive user	Browsing Visits(Infotainment)/ Entertainment/ Fun	Search engine (google,yahoo,bing),movie,youtube, online game etc.
Specialize/sophisticated/expert user/student	Research Visits(Intended to do so): study & Research / Feedback/FAQ/Comment	Wikipedia,wikimapia,google scholar,google map,encyclopedia,admission inquiry on various institute,etc.
Business user	Focused Visit(Committed to do so): Trading,online reservation,online purchase,money transfer,online recharge	Sherkhan,irctc rail ticket reservation,ebay/jabong,western union money transfer,paytm mobile recharge,etc.
Frequent user	Social interaction	Chatting,video calling,mailing,etc.
Developer	Personal Blog/Mailbox	Blogspot,yellowpages,etc.

IV. ANALYSIS FOR FINDING THE WEBSITES USABILITY (WS)

Enabling Web services requires that we make data available for use by applications without knowing *a priori* exactly how that data will be used. How can we do that? By being smart about how we design our new data sources and about how we enable access to our legacy data sources[8]. As shown in the figure 3 Web services are self-contained, Internet-enabled software applications capable of not only performing activities on their own, but also possessing the ability to engage other Web services in order to perform higher-order activities. The figure-1 defines that why to analysis is required.

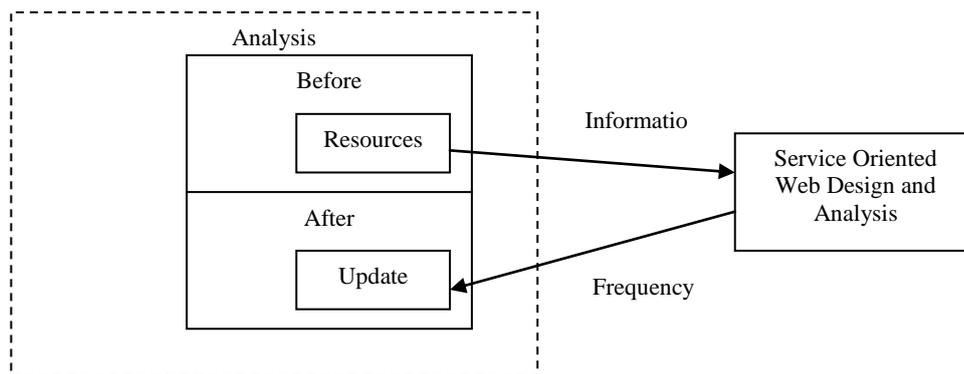


Fig-1: about the analysis of websites

The figure-2 shows the detail information provided by a websites, as it is taken from the yahoo.com web sites.



Fig-2: information that provided in the websites

As in [10] it describe about the types of web sites that belongs to different type of information that provided as shown in the below table-

Table-III: it describe about the type of website that use the different information's

Static	Dynamic(interactive/beyond static -web 2.0)
Serve or capture information but don't allow engagement with the audience directly .	Community of sites and allow for interactivity between the site owner and site visitors i.e DOM(document object model- browser's internal representation of the content).
<ul style="list-style-type: none"> - Introduction - Summary - Comparison - Search - Difference - Policy or Rights 	<ul style="list-style-type: none"> - Linking - Picture - Video - Animation - Script - Customer support - FAQs/ Feedback - Suggestion

4.1 Analysis of Websites Before Design

It is important to identify the various information's as mentioned above for design of the sites. There are several requirements for design a site and defining of the information. Recently, a method for the assessment of the timeliness of Websites has been proposed using sets of assessment criteria in the literature [5]. The following criteria are proposed to evaluate the Web timeliness.

- Is there an indication of when the information was created/published?
- Is the information regularly revised or updated?
- Is the information still valid for your topic? In [3], the following five criteria were given to assist in evaluating the Website timeliness.
- When the information was created or last updated?
- Is the source appropriate for your needs with regards to the time that the source of information was published?
- How current are the links, statistical data, illustrations, etc.?
- Does the information appear to be valid and well researched, or is it questionable and unsupported by evidence?
- What is its relation to other works on the subject, especially with regards to the time?

Such criteria also provide useful design guidelines, or heuristics, for Website designers. However, it is rather difficult to validate the correctness and completeness of such heuristics. Furthermore, the application of the criteria is difficult to give accurate assessment and comparison of Websites' timeliness.

4.2 Analysis of Website after Design

It is essential that once Web site is successfully designed and implemented, then it is need to maintenance as well as updating of its information for better service provider, it is necessary to identify when the Web site is required for updating, here we are given a proposal for it when it need to updating. Having a measure for the effectiveness, measures for efficiency will focus on evaluating the time it took the user to complete her task[9]. A Web site is efficient if the user is guided to the content quickly, demanding a short duration on navigation pages. This indicator is the time the user stays on each Web page. The duration depends not only on the user, but also on the text length. In order to make all durations comparable we normalize all values as described in the following section.

Most of the Web sites are update depends upon its time period or owner want to need update information or some other factors. The updating & maintenance is manually worked. Now it is required to identify whether the websites are need update or not. As most of the websites are customer oriented. So the up gradations are depended upon the usability of websites by customer. The usability and the frequency that customer visited the sites are decide whether the site required to upgrade or not. The following equation identified the usability time of a websites. The total time of usability can identify by

$$D_{ur}U_{se} = TRAS_{ites} + TUI_{nfo} + OTF_{actor} \quad \text{-----(i)}$$

$D_{ur}U_{se}$ = Duration of Usability
 $TRAS_{ites}$ = Time Required to Access the Sites
 TUI_{nfo} = Time to Use the Information
 OTF_{actor} = Other Time Factors

Equation 2 defines the time required to access the sites is deepened up on the Size of the Website (SWS_{ite}) and Channel Rate (CR_{ate}). The channel rate depended upon the types of channel are used.

$$TRAS_{ites} = SWS_{ite} / CR_{ate} \quad \text{-----(ii)}$$

In equation 3 it shows that how to determine the size of the web sites. A Website is a collection of Web pages, images, videos or other digital assets that is hosted on one or more Web servers, usually accessible via the Internet. The table 4 contain the information and its description provided by[10]

$$SWS_{ite} = \text{Total Memory Allocation for } (P_{age}C + M_{edia}C + P_{rogram}C + P_{icture}C + I_{nformation}C) \text{ -----(iii)}$$

Table-IV: it describe the information's that contain in a websites.

Information	Description
Page count ($P_{age}C$)	Number of HTML files used in Web application
Media count ($M_{edia}C$)	Number of Media files used in Web application
Program count ($P_{rogram}C$)	Number of CGI Script, VB Script, J Script etc. files used in Web application
Picture count ($P_{icture}C$)	Number of Picture used in Web application
Information Count ($I_{nformation}C$)	Number of different Information texts are used in Web application

A Web site is a Collection of several Web pages and a Web page is consists of several information. Each information's required few times to navigate

Web page = Different type of information combining and it need some time for navigate

$$P = \sum_{i=1}^{Information\ type} I_i * T$$

Web sites = Different Page consists

So total time required to use the information is depend on

$$TU_{Info} = \sum_{i=1}^{Number\ of\ pages} P_i$$

Now the Website Creditability (WC) is decide whether the Website is properly used by the customer or decide that whether its need updating. It can be identified by Duration of User Access the Site ($DUAS_{ite}$) and divide by the Duration of Usability ($D_{ur}U_{se}$)

$$\text{Web Site Creditability} = \frac{\text{Access Time by User}}{\text{Website Duration of Usability}}$$

If web site creditability is less than one then it need the updating, but as per the statistical rule (either accept/true(1) or deny/false(0/<1)) if the average user navigate of site frequency is below 1 then it need updating of sites .

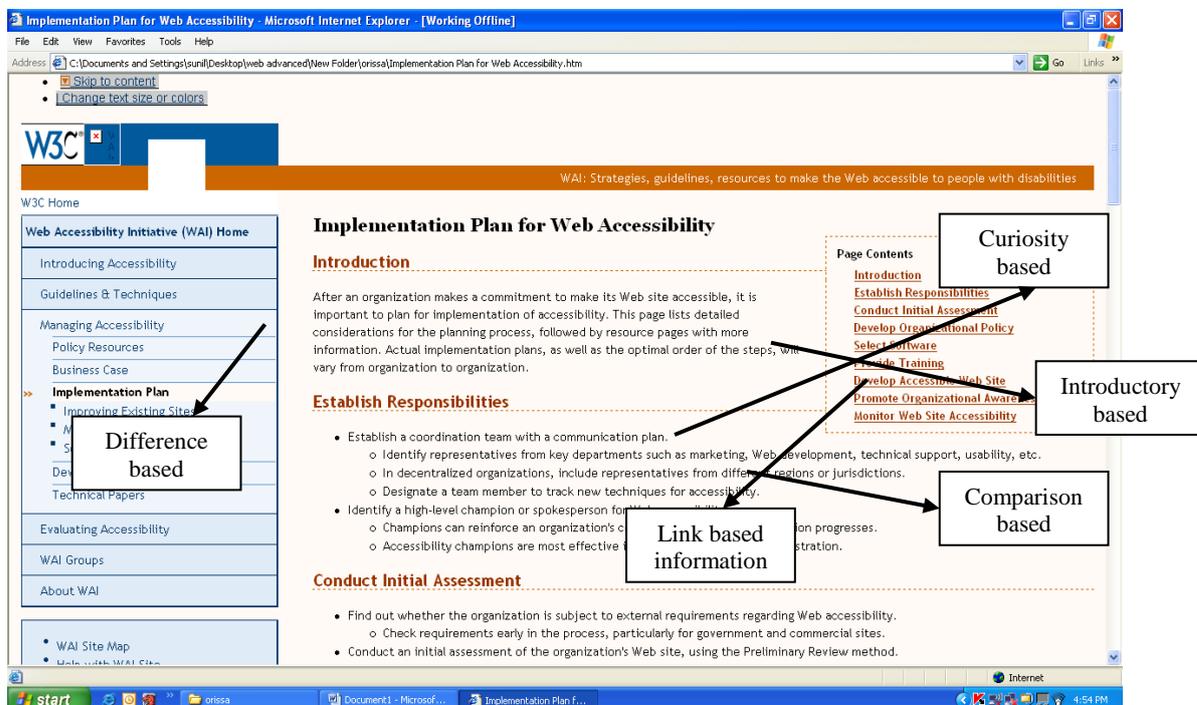


Fig-3: it shows the information that contain in W3C websites.

As shown in the figure 3. the site contain the 5 pages, no media file, 10 program file, 8 picture file, 12 information file. The size of page is 20 KB, program is 24KB, picture is 80KB, and information is 62KB. So the total size of the site is

$$\text{Total Size of the Website is} = (5 * 20 + 10 * 24 + 8 * 80 + 12 * 62) \text{ KB} = 1724\text{KB}$$

Let the Channel Rate is 256KB/S

Time Required to Access the Site = Size of Site / Channel Rate

$1724/256 \text{ Sec} = 6.73 \text{ Sec}$

Let the Page contain following information

1.Introductory based information 15 no

2.Comparison based information 7 no

3.Curiosity based information 24 no

4.Difference based information 8 no

5.Link based information 12 no

As each information required some time to access so the Total time to Navigate the Information is

$$= (15 * 4 + 7 * 5 + 24 * 3 + 8 * 9 + 12 * 2) \text{ Sec} = 263 \text{ Sec}$$

And the Other factor that take time as per the user speed, mood etc is 45 Sec

So the Duration of Usability of this site is = $(6.73 + 263 + 45) \text{ Sec} = 314.73 \text{ Sec}$

The Creditability of the site = Access time by user / Duration of Usability

Let the Access time by user the site is 250 sec so its creditability is $(250 / 314.73) .79$ which is below 1, so it need update, but as per the rule if the average user navigate of site frequency is below 1 then it need updating of sites.

V. CONCLUSIONS

In the literature of Website design, there exist a couple of assessment criteria to evaluate Website creditability. However, these criteria for evaluation of Websites are based on different understanding of the issue. They are difficult to validate in terms of completeness and correctness. Website quality measures can provide insight into such issue. They can be used to measure the Website quality attributes in an objective and economic way. However, it requires manual collection of data. It can be automatically computed without human interferences. This paper focused on the development and validation of Websites uses measures.

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REFERENCES

- [1] *Evaluating Web Applications Testability By Combining Metrics And Analogies* Alessandro Marchetto Alessandro.Marchetto@Unimi.It andrea Trentini Andrea.Trentini@Unimi.It Dipartimento Di Informatica E Comunicazione, Universita Degli Studi Di Milano, Italy.
- [2] G. A. Di Lucca, A. R. Fasolino, P. Tramontana "Web Pages Classification Using Concept Analysis" *ICSM 2007* Pp. 385-394.
- [3] L. Baresi F. Garzotto, And P. Paolini. *Extending UML For Web Applications. 34& Annual Hawaii International Conference On System Sciences (HICSS-34), Maui, Hawaii.* January 2001.
- [4] *A Queuing Model For Service Selection Of Multi-Classes Qos-Aware Web Services* Elarbi Badidi1, Larbi Esmahi2 , M. Adel Serhani3 1,3College Of Information Technology, United Arab Emirates University PO.Box. 17555, Al-Ain, United Arab Emirates Email: {Ebadidi,Serhanim}@Uaeu.Ac.Ae 2Center For Computing And Information System, Athabasca University, 1 University Drive, Athabasca, Alberta, T9S 3A3, Canada Email: Larbie@Athabascau.Ca.
- [5] Dan Et Al., "Web Services On Demand: Wsladriven Automated Management", *IBM Systems Journal*, Vol 43, No 1, 2004, Pp. 136-158.
- [6] Padovitz, S. Krishnaswamy, And S.W. Loke, "Towards Efficient Selection Of Web Services", Workshop On Web Services And Agent-Based Engineering, WSABE 2003, Held In Conjunction With The Second International.
- [7] *Joint Conference On Autonomous Agents And Multi-Agent Systems, AAMAS'03*, Melbourne, Australia, 2003.
- [8] L. Barnard And J. L. Wesson. *Usability Issues For Ecommerce In South Africa: An Empirical Investigation.* Pages 258-267, 2003.
- [9] Website - Definition Of Website By The Free Online Dictionary, Thesaurus And Encyclopedia". [Thefreedictionary.Com](http://thefreedictionary.com). Retrieved 2011-07-02.
Comparison Of Web Size Measures For Predicting Web Design And Authoring Effort By E.Mendes,N.Mosley,S.Counsell.